Transmitted by the expert from Japan

Informal document No. **GRSP-48-xx**
(48th GRSP, 7 - 10 December 2010, agenda item 3)

2nd progress report of the informal group on Phase 2 of gtr No. 7
(Head restraints gtr Phase2)

Note:
The text reproduced below was submitted by the representative of Japan and proposes amendments to the 1st progress report of the informal group on Phase 2 of gtr No.7 (ECE/TRANS/WP.29/2010/136). The proposed amendments are marked in bold and in strikethrough characters.

Objective of this proposal

1. The representative of Japan proposed the development of Phase 2 of gtr No. 7. The amendments proposed by the United State of America were incorporated in the proposal.[1] He also proposed the establishment of an informal group for the development of this Phase. The informal group received the mandate to discuss appropriate methods for testing and evaluating injuries due to rear impact crashes.

II. Background

2 At its 143rd session in November 2007, the World Forum for Harmonization of Vehicle Regulations (WP.29) agreed to provide guidance to the Working Party on Passive Safety (GRSP) for the development of the draft gtr on head restraints (ECE/TRANS/WP.29/1064, para. 81) and that Phase 2 of the gtr should consider, as indicated in informal document No. WP.29-143-23-Rev.1, the following issues:

(a) The head restraint height of 850 mm;

(b) The appropriate dynamic test, including the test procedure, injury criteria and the associated corridors for the biofidelic rear impact dummy II (Bio RID II).

3. At its 148th session, in June 2009, the Executive Committee of the 1998 Agreement (AC.3) agreed on the two-step approach suggested by the representatives of the United Kingdom and of the United States of America. This approach will consider whether Bio RID II can more effectively address injuries occurring in low speed rear impact crashes and focus on reducing injuries in higher speed rear impact crashes as a second step.

4. To address minor neck injuries (maximum abbreviated injury scale 1 (MAIS)) that occur in low speed rear impact crashes, insurance industry groups, such as the International Insurance Whiplash Prevention Group (IIWPG) (Insurance Institute for Highway Safety (IIHS) and Thatcham), have been conducting dynamic evaluations of seats. The European new car assessment programme (EuroNCAP) introduced dynamic evaluations of seats in 2008, and the Japanese new car assessment programme (JNCAP) introduced dynamic evaluations of seats in 2009. However, the testing and evaluation methods vary from one programme to another. Additionally, the European Enhanced Vehicle-safety Committee (EEVC) Working Group 12 has been investigating the appropriate dynamic test, to address minor injuries in low speed crashes, including the test procedure, injury criteria and the associated corridors for the Bio RID II dummy.

5. At its June 2009 session, AC.3 gave its consent to establish the informal group, under the chairmanship of the United Kingdom and with the technical sponsorship by Japan, to evaluate whether the Bio RID II dummy can be adopted into gtr No. 7 to assess the protection against low speed rear impact injuries.

6. At higher speed rear impact crashes ($\Delta V \geq 18$ km/h), there are as many minor injuries as recorded in the low speed crashes and there are a significant number of more severe injuries MAIS 2 and MAIS 3 occurring in some countries. The United States of America is currently evaluating several dummies and a dynamic test that could address these injuries. As a second step, AC.3 will resume consideration of development of a high speed test at its November 2010 session.

[1] ECE/TRANS/WP.29/2008/115, ECE/TRANS/WP.29/2009/47 and ECE/TRANS/WP.29/2009/48

7. At its 149th session, in November 2009, Japan submitted to AC.3 a proposal for the development of amendments to the gtr, prepared jointly with the United Kingdom and the United States of America, and the revised timetable. AC.3 agreed to develop the amendment to the gtr. As a first step, the amendment work will focus on developing a low speed dynamic test using the Bio RID II dummy. Regarding the head restraint height, as a first step the procedures for defining the effective height will be considered. Detailed discussions on dummies will be conducted by a Technical Evaluation Group (TEG), which is to be established under the auspices of the informal group. Drawings detailing the uniform specification of the test tools will be developed and provided to the Secretariat as reference material.

III. Subjects for review and tasks to be undertaken (terms of reference)

8. With regard to head restraint height, the informal group should decide:

   (a) How to define the effective height;

   (b) The height requirements.

9. With regard to low speed dynamic test, the informal group should:

   (a) Define test conditions that reflect accidents in the real world, including the performance of seat backs and head restraints as a system:

      (i) Tests conducted on the whole vehicle as available on the market, and/or on production seats mounted on sleds;

      (ii) Number and conditions of sled pulses.

   (b) Working within the accepted knowledge concerning the mechanism of minor neck injury and other rear impact injuries, identify parameters that may be used to advance developments in occupant protection through, for example:

      (i) Analyzing accidents;

      (ii) Performing volunteer tests (low speed only) and simulations with human body finite elements (FE) models.

   (c) Evaluate dummies that reflect the above mechanism with high fidelity to the human body and which demonstrate an acceptable level of perfection as a measuring instrument:

      (i) In particular, the dummy evaluations shall include an assessment of their biofidelity in the critical areas associated with the safety technology under review, their repeatability and their reproducibility;

      (ii) Define the dummy sitting conditions to minimise variation in test results;

      (iii) Harmonize the test dummy and calibration test.

   (d) Evaluate indicators of human body injury that reflect the minor neck and other rear impact injury mechanisms:

      (i) For example, measure the relative movement between the upper and lower parts of the neck and the forces applied to each of these parts.

   (e) Define reference values which should be based on the results of injury risk analysis and feasibility studies.

10. With regard to evaluation, the informal group should evaluate the effects on reduction of injury and cost-effectiveness of the proposals.

IV History of the discussions

11. Head Restraint Height

The Netherlands proposed to measure the height by combining it with the backset in order to ensure the effectiveness of head restraints for tall occupants. At the second informal group meeting, the Netherlands pointed out that the backset is not considered under the methods of the current UNECE Regulation No. 17, EuroNCAP, and IIWPG and proposed a new evaluation method that combines the height and backset. In this evaluation method, measurements are performed at the center only. Measurements according to this evaluation method would require the height to be raised by about 40 mm. Some issues related to this method were pointed out, such as remaining uncertainties, reproducibility/repeatability, and hindrance to rear visibility.

At the fourth informal group meeting, the Netherlands explained the status of their consideration of new head restraint height requirements. The head restraint height will be considered by measuring the backset based on the 95%tile HRMD template proposed by the Netherland. The evaluation of effectiveness had been reported in the accident analysis by EEVC (HR-10-6). Japan pointed out that the evaluation method for active head restraints is necessary. Japan also pointed out the issue of schedule. The chairman directed to clarify the necessity of amendment, evaluation method, and schedule. OICA also pointed out that a lot of additional comments and questions in February 2010 which were not answered yet. OICA and the Netherland will collect some data about the head position according to the RAMSIS system until December 2010.

12. Dynamic Evaluation Method

Number and conditions of sled pulses for the low speed dynamic test

Based on a study conducted by Japan, accident analysis and accident simulation tests indicate that, for reducing permanent disabilities, it is appropriate to set the sled pulse at EuroNCAP's medium waveform between ΔV=16 km/h and 25 km/h. However, it has been found that in the repeatability tests at 20 km/h the results vary largely due to variations in the seat deformation. In the future, improvements in reproducibility and repeatability will be studied using a new dummy calibration method.
A discussion of appropriate speeds to protect both long-term and short-term was held at the fourth informal group meeting, together with evaluation indicators. While some countries wanted to set the speeds now, other countries argued that it was difficult to set the test speed until there was a decision made on the evaluation indicators and a benefits analysis could be conducted.
[The two-step approach suggested by Japan was discussed. This approach will consider 16km/h dynamic test with an option of static backset requirements as step 1 and approximately 20km/h dynamic test as step 2.]

13. Accident analysis

In Japan, rear impact crashes account for 31 per cent of all traffic collisions, and 92 per cent of these result in minor neck injuries based on all accident macro analyses. As for the crash speed, the accidents occur most frequently at ΔV=15 km/h and below, which can be seen in about 60 per cent of all cases. Even at ΔV=20km/h and above, AIS2+ neck injuries account for 2 per cent only, and most of the resulting injuries (60 per cent or more) are AIS1 neck injuries. In recent years, the number of permanent disabilities has been increasing, and they occur most frequently at ΔV=16-22 km/h, however, these ΔV analyses are based on small accident numbers micro analyses.

14. Evaluation Indicator and Reference Value

(a) Japan gave a presentation at the "meeting of interested experts" that met in advance of the establishment of the informal group. It had been found in the results of the past studies on neck injuries and volunteer tests that there are correlations between neck strains/strain rates and occurrences of injuries. Risk curves for each case were created based on the results of accident analysis and simulations. Injury indicators that have high correlations with strains/strain rates and can be measured using dummies were extracted. As a result, relationships between strain rates and NIC and between neck strains and neck force (Upper& Lower Fx, Fz, My) were shown, and their risk curves were created. Japan proposes that these be used as the basis for injury criteria. For some indicators no risk curve could be drawn and other alternative indicators were used.

(b) In addition to Japan's proposal above, there is another proposal on evaluation indicators: EEVC's proposal for "Dynamic backset", submitted at Phase 1.

At the fourth informal group meeting, PDB reported the evaluation of reproducibility of 8 dummies. The reproducibility was poor in the neck force (Fx, Fz, My), while acceptable in acceleration (but cv>10% for NIC) and kinematic behaviour (cv<10% for dynamic backset). However, standard evaluation method for dynamic backset should be prescribed since variability is inherent in video analysis.

15. Dummies

Discussions on dummies had been conducted as part of the Global Bio RID Users Meetings (GBUM) activities up to the first informal meeting. However, starting with the second meeting, the GBUM activities were incorporated into those of the TEG who hold web meeting approximately once a month.

16. Biofidelity

(a) At the "meeting of interested experts", the current status of the study by EEVC Working Group 12 (WG12) and WG20 and results of discussions on biofidelity were reported. The biofidelity in volunteer tests at 7-9 km/h was verified using qualitative procedures and quantitative core method, and Bio RID II presented the best results.

(b) The United States of America reported on the progress of its studies on the biofidelity of dummies and injury mechanisms for the evaluation of AIS3+ injuries in mid- and high-speed rear impact crashes. Based on their results, a seat for sled tests was created. In addition, the biofidelity was compared with data from post-mortem human surrogate (PMHS) experiments, Bio RID, RID3D, and Hybrid III to determine the most appropriate dummy. Further,

the injury mechanisms were examined to determine and verify the instrumentation to the spine and to define the injury behavior.

(c) At the second informal meeting, the National Highway Traffic Safety Administration (NHTSA) reported the progress of its research. To define the injury movement, the rear impact test was conducted, using the test seat, at 24 km/h with a deceleration of 10.5g. The test was also performed at 16.7 km/h and 8.5g.

At the fourth informal group meeting, NHTSA reported the results of research on repeatability/reproducibility and biofidelity. NHTSA conducted dynamic tests at 17.6km/h and 24km/h. They also conducted tests comparing PMHS with Hybrid II, Bio RID, and RID3D. Those dummies showed different biofidelity in head displacement and rotation during tests for reproducibility, repeatability, and biofidelity. The ramping-up behaviour was quite different between PMHS and dummies. The evaluation of biofidelity and repeatability will be completed by the end of October and December of 2010 respectively. NHTSA also reported the comparison of sensitivity and reproducibility among dummies. They evaluated Bio RID II and Hybrid III using the seats with large and small backset and waveforms specified in FMVSS 202a and EuroNCAP to compare their sensitivity. The tests for comparing posterior inclination of those dummies under conditions for EuroNCAP and JNCAP will be completed in November, 2010.

[OICA has requested to add that the biofidelity assessment has to be done for different seatback angles with the BioRID II, the Hybrid III, and the RID3D.]

(d) The informal group is focused on delivering a single harmonised approach, but depending on the result the Bio RID procedure may have to be introduced as an option alongside Hybrid III with each Contracting Party specifying their dummy of choice (Hybrid III or Bio RID II).

The chairman suggested extending the term of Phase 2 consideration approximately 2 years, aiming adoption at GRSP in December, 2012 and proposal to WP29 in June, 2013 because the harmonization of dummy may be possible if the coordinated research between Japan and the United States, scheduled to be completed by the end of 2011, is successful in establishing injury criteria with a biofidelic basis.

[Japan commented to this suggestion that the option of Bio RID II should be added in May, 2011 as scheduled in current TOR since the neck injury is a serious problem to be addressed in the regulation immediately. Then, the following two options were proposed;

Option 1: gtr 7 will be amended in May, 2011 to specify dynamic backset evaluations using either Hybrid III or Bio RID II. Then, as a second step, harmonization of dummy, evaluation of upright postures, tests at higher speed and mid speed (suggested by the United States) will be considered in 2014 and later.

Option 2: Proposal to revise gtr 7 to specify harmonized dynamic evaluation based on the injury criteria using Bio RID II only will be submitted to GRSP in December, 2012. Then, as a second step, harmonization of dummy, evaluation of upright postures, tests at higher speed and mid speed (suggested by the United States) will be considered in 2014 and later.]

[BMW comment: As of today it was not possible to demonstrate that the BioRID II Dummy together with the proposed injury criteria and possible tolerance limits would be a suitable test tool that delivers repeatable and reproducible results. Therefore this dummy is not acceptable to be implemented in a legal requirement. Proposing at this stage an amendment of GTR 7 or the ECE Regulation 17 is premature and not acceptable. Both options may only be taken into consideration given that future work can demonstrate the suitability for all seating configurations and torso angles of the BioRID II.

Comment Daimler: Your concept for the future strategy for GTR7 is based on two possible options:

Option 1 is a very quick introduction of the BioRID dummy in the GTR7 in 2011, but only as an alternative to the Hybrid III. In our optinion this option is not acceptable, because introducing two optional dummies, especially when selected up to the descision of the contracting parties, is not what we understand by harmonisation and will lead to the fact, that we have to design our seats and head restraints to meet the requierements for both dummies. These requirements may be contrasting and will double the number of tests.

Option 2 will only introduce the BioRID dummy until 2012 and will care about hormonization matters for more upright seating positions later on (until 2014). What we are missing in this option, and also in the whole status report, is to make sure the presumption, that the BioRID is suitable for testing and measuring at all. Without having investigated the dummy behaviour and whithout having a good scientific basis for the dummy and injury criteria, we can not agree to introduce the BioRID dummy in the GTR. Therefore we would like to mention this in the proposed option 2.

In addition there is again a restriction in option 2, if there will be difficulties with the harmonization of the dummy. Here we have the same statement like for option 1, which means that we can not agree to have two dummies as options in the regulation.]

17. New head restraint measurement device (HRMD) drawing

(a) The current H-point machine is defined in Society of Automotive Engineers (SAE) SAE J826, and the HRMD was developed in the 90s. For either machine, there are large variations in products available on the market, resulting in variations in the backset measurements.

(b) At the 2nd informal meeting, the result of research conducted by the German manufacturer's association (VDA) was introduced. VDA developed a new H-point machine and a testing jig called Dilemma by taking the average of many H-point machines and harmonizing it with the SAE standard. For this, it is scheduled to issue the VDA specifications in February 2010, propose it to the SAE standard.

(c) At the fourth informal group meeting, it was reported that the draft of 3D CAD data of SAE HADD J826 H-Point manikin was completed and to be submitted to SAE conference on October 20. If this draft is agreed at this conference, it will be possible to release 3D CAD to the public. The measuring method with HRMD is under consideration and will be suggested by March, 2011.

18. Dummy drawings (2D & 3D)

At the first and second informal meetings, the progress of the drawing harmonization by Denton and First Technology Safety Systems (FTSS) was reported. The 2D drawing (PDF form), 3D drawing (STEP form), and user's manual are scheduled to be created jointly between the two manufacturers.

At the fourth informal group meeting, Humanetics reported that the drawings had been posted on GRSP website. They also reported that 3D data is ready, but PADI is under revision. They are preparing the list to be included in PADI for checking most recent dummy. The chairman pointed out that a method to clarify the appropriateness of the build level of Bio RID II is necessary. The suggestion from Japan to provide PADI along with drawings in a same website was agreed.

19. Certification procedures

(a) At the "meeting of interested experts", the history of discussions on the new certification test at GBUM and the summary of those discussions were presented. As regards the new certification test, tests were completed in Korea, Japan, the United States of America, and Europe. The sled waveform has become more flat, showing good reproducibility. At the second informal meeting, it was proposed to change the calibration waveform in order to match the EuroNCAP medium pulse and dummy input. However, the Chairman commented that since the Terms of Reference (ToR) of these gtr states that our objective is to specify the uniform method for evaluating low speed impacts and the low speed is defined as ΔV18 km/h or below, we should aim the sled waveform at around 16-18 km/h and discuss the calibration waveform based on the current proposal (GBUM2009).

(b) At the third meeting, the Bio RID TEG reported on the new certification test method with the head restraint. While the development is heading in the right direction, there are concerns that the head to head restraint contact time is a little too short (10-20 ms). **Regarding the presence of head restraint in the new sled, Humanetics will develop a draft of detailed method. It will be evaluated by PDB, Japan, Ford, and GM.**

(c) Jacket impact assessment was adopted as another improvement of dummy, while pelvis impact assessment was not due to its poor effectiveness. Skull CAP switch OP is to be included in the drawing package.

20. Repeatability and reproducibility

(a) In testing, good repeatability is obtained if the same dummy is used. However, there are problems with reproducibility among different dummies. Work to establish a common build level for the Bio RID IIg, together with improvements to the dummies and revisions of certification tests are being discussed to improve the repeatability and reproducibility.

(b) At the third meeting, Japan reported the results of the new dummy calibration methods and sled tests. The same variations in LowerFz that had been seen in the new certification test method with the simulated head restraint were also observed in the sled tests. Accordingly, it is considered effective to use the head restraint in the certification test, especially to minimise variations around the contact time. However, there are differences in absolute values

between certification and sled tests, so will be discussed further September 2010.

(c) At the fourth informal group meeting, it was reported that the there was a quite large difference between sleds when one seat was tested for evaluating the reproducibility using acceleration and deceleration sleds. It was difficult to keep the pulse within the corridor when using the deceleration sled. It was also pointed out that the backset changed due to the movement of dummy head during approach. These issues are kept as items to be monitored.

(d) OICA reported the evaluation of reproducibility of 8 dummies. The reproducibility was poor in the neck force (Fx, Fz, My), while acceptable ~~good~~ in acceleration (but cv>10% for NIC) and kinematic behaviour (cv<10% for dynamic backset).

21. Dummy seating conditions

(a) At the "meeting of interested experts" and at the first informal meeting, regarding the seating procedures of IWPG and EuroNCAP, Japan made proposals on:

(i) Design reference torso angle,

(ii) Reduction of backset tolerance, and

(iii) Special adjustment in the case of smaller torso angle (more upright) seats typically used in small N_1 vehicles (especially those with forward control), and explained the reasons for the proposals (GTR7-01-09e).

(b) At the second informal meeting, Japan reported that in general the torso angle is at about 15° in trucks and vans, and it proposed to specify an optional spine angle to accommodate these upright seats. Denton Inc. (a manufacturer of Bio RID) presented a new spine comb to set the dummy for a more erect seating posture. The appropriateness of the dummy when set to this condition is being evaluated.

(c) At the third meeting, regarding the standard seating posture, basic agreement was reached on adopting the design reference angle proposed by Japan.

Japan reported the influence of the difference of seating postures at design torso angle and 25 degrees on evaluation. They reported that there was no specific tendency in the difference between two same seat with conditions of JNCAP (design angle, 20 to 25 degrees) or IIHS (25 degrees).

(d) Japan reported the results of tests that it had conducted to study the new tool for upright postures using a smaller torso angle (10°) for commercial vehicles. It was found that while the dummy spine could be set to the revised posture when the dummy is equipped with its jacket, its upright posture will tilt forward largely and it is unable to keep its head fully horizontal. For this reason, it was decided that, for applying the upright posture tool, development of the jacket, etc. will be undertaken as a second step.

Japan and OICA reported the ratio of seats with upright torso angle in the market. Japan reported that such seats account for 45% of all seats in the Japanese market and pointed out the necessity of static backset option until the dummy representing upright posture is developed.

OICA reported that the overall world wide ratio (which includes the Japanese data) of seats with upright torso angle is 12% .

It was agreed that static evaluation is kept as an option until the dynamic evaluation is proved to cover all types of seats.

[BMW comment:
The new tool needed to assure the correct posture and usability of the BioRID II dummy makes it essential to investigate if the BioRID II in its more upright position can still be used with its former jacket. First test results indicate that this is not the case. In addition a new Biofidelity assessment is necessary for the more upright BioRID II regardless if the old or a new jacket will be used.
In addition there is still a major concern for vehicles that are fitted with active headrests in upright seating positions. The dynamic headrests are usually fitted to enable larger backsets for sensitive customers, and while such a concept is perfectly safe it could not be used due to a test tool that is not ready for regulatory use.
It must be ensured that also vehicles with an upright seating position and active head restraints can still be certified using a dynamic option, a simple static backset option is not sufficient.]

22. Dummy Durability

The neck damper was damaged in Korea only, when the new calibration test procedures were performed. Ford pointed out that it is necessary to add a body block to the calibration sled to prevent damage to dummies.
At the fourth informal group meeting, it was found that this issue is not a problem at this moment because it is special to Korea.

V. Work schedule

23. First step (under the chairmanship of the United Kingdom and with the technical sponsorship of Japan)

Working Groups	Dates	Venue
"meeting of interested experts"	2009/11/6	Washington D.C., United States of America
1st informal meeting	2009/12/8	Geneva, Switzerland
2nd informal meeting	2010/2/2-3	Tokyo, Japan
3rd informal meeting	2010/5/17	Geneva, Switzerland
4th informal meeting	2010/9/21-22	Germany
5th informal meeting	**2010/12 /6**	Geneva, Switzerland
6th informal meeting	2011/2	
7th informal meeting	2011/5	Geneva, Switzerland

8th informal meeting	**2011/6**	**Washington DC**
9th informal meeting	**2011/**	
10th informal meeting	**2011/12**	**Geneva, Switzerland**
11th informal meeting	**2012/5**	**Geneva, Switzerland**
12th informal meeting	**2012/**	
13th informal meeting	**2012/12**	**Geneva, Switzerland**

Step 1

Tasks	Dates
At the 145 session of WP.29, Japan officially proposed to set up Phase 2 of the Head Restraint gtr.	2008/6
At WP.29/AC.3, it was proposed to establish the informal group.	2009/6
At WP.29/AC.3,TOR was approved.	2009/11
1st progress report to GRSP	2010/5
1st progress report to WP.29/AC.3	**2010/6**
2nd progress report to WP.29/AC.3	**2010/11**
3rd progress report to GRSP	**2010/12**
3rd progress report to WP.29/AC.3	**2011/3**
4th progress report to GRSP	**2011/5**
4thprogress report to WP.29/AC.3	**2011/6**
5th progress report to GRSP informal proposal for low-speed requirements submitted	**2011/12**
5thprogress report to WP.29/AC.3	**2012/3**
6th progress report to GRSP	**2012/5**
6thprogress report to WP.29/AC.3	**2012/6**
Final progress report to WP.29/AC.3	**2012/11**
Official proposal for low-speed requirements submitted to GRSP	**2012/12**
Proposal for low-speed requirements adopted at WP.29	**2013/6**

Step 2 (Dummy and seating procedure for upright seat)

Tasks	Dates
TBD	TBD

24. Second step (High-speed requirements) (under the chairmanship of (TBD) and with the technical sponsorship by the United States of America)

Tasks	Dates
Draft TOR submitted to GRSP	2010/5
Establishment of high-speed test methods to be decided at WP.29	2010/11

25. Documents for the meetings

WM-0-1 1st Dummy TEG Attendance list

WM-0-2 EEVC presentation

WM-0-3	(JASIC/Japan) Bio RID seating position
WM-0-4	(Denton) Bio RID II user's meeting
WM-0-5	(First technology) Whiplash updates
WM-0-6	(Japan) Neck injury criteria risk
WM-0-7	(NHTSA) VRTC rear impact
WM-0-8	Rear impact task definition
GTR7-01-02	(JASIC/Japan) Proposal for BioRIID II dummy standardizatiion activity for gtr No.7- Phase2
GTR7-01-03	(The Netherlands) Front contact surface
GTR7-01-04	Comparisons for different Spine adjustment
GTR7-01-05	(Japan) Schedule of Head Restraint gtr Phase-2 Informal Working Group
GTR7-01-06	(Denton) Global Bio RID-II User's Meeting
GTR7-01-07	(Republic of Korea) GTR No.7 2nd Phase Research Results
GTR7-01-08	Terms of reference of the informal group on Head Restraints phase 2
GTR7-01-09	(JASIC/Japan) Bio RID II seating proposal
GTR7-01-10	Draft minutes of the 1st Informal Working Group Meeting for gtr No. 7 – Head Restraints Phase 2
GTR7-02-01	Draft agenda of the 2nd Informal Working Group Meeting for gtr No. 7 – Head Restraints Phase 2
GTR7-02-02	(LEAR) HPM Variations
GTR7-02-03	(LEAR) HRMD Variations
GTR7-02-04	(AUDI) New HPM and HRMD Standards
GTR7-02-05	(VDA) Certification of the H-Pt. and Backset measuring equipment and its calibration
GTR7-02-06	(First technology) Global Bio RID-II User's Meeting
GTR7-02-07	(First technology) Seat/Head Restraint Test Sled Pulse Summary
GTR7-02-08	(NHTSA) Rear Impact Dummy Biofidelity
GTR7-02-09	(First technology) Bio RID II Drawing Harmonization
GTR7-02-10	(First technology) Seat/Head Restraint Test Sled Pulse Summary
GTR7-02-11	(Chalmers) Bio RID new certification procedure
GTR7-02-12	(Denton) Background of GBUM certification test
GTR7-02-13	(Denton) Pulse feasibility investigation
GTR7-02-14	(Denton) New dummy head
GTR7-02-15	(The Netherlands) Head Restraints Static Height and Backset Measurement
GTR7-02-16	(JASIC/Japan) Crash pulse research status based on Japan accident research and vehicle rear impact test

GTR7-02-17	(JASIC/Japan) Japan research activities for new bio rid ii calibration method in the gtr-7 phase 2 iwg
GTR7-02-18	(The Netherlands) Head Restraints Static Height and Backset Measurement
GTR7-03-01/Rev.1	**Minutes of the meeting**
GTR7-03-02	**Bio RID II Smaller Design Torso Angle seat seating trial**
GTR7-03-03	**(Japan) Repeatability and Reproducibility study with new Bio RID II calibration method**
GTR7-03-04	**3rd Meeting of the IWG GTR No. 7- Draft Status Report of the Bio RID TEG**
GTR7-03-05	**GTR-7 IWG Meeting 3 – Summary of Decisions and Actions**
GTR7-04-01	**Bio RID II Drawing package - 7/23/10 version**
GTR7-04-02/Rev.1	**Agenda of the meeting**
GTR7-04-03	**(The Netherlands) Head Restraints - Static Height Requirements**
GTR7-04-04	**(Japan) gtr No.7 Phase 2 Dynamic Evaluate Condition and Criteria Proposal**
GTR7-04-05	**(JARI) Influence on Cervical Vertebral Motion of the Interaction between Occupant and Head Restraint/Seat, based on the Reconstruction of Rear-End Collision Using Finite Element Human Model**
GTR7-04-06	**(PDB) Summary of the Bio RID-IIII Test Program**
GTR7-04-07	**(Faurecia) Whiplash Criteria Repeatability with different dummies & sleds**
GTR7-04-08	**(Humanetics) Drawing and PADI statusand a Checklist for EvaluatingDummy Acceptability for Use**
GTR7-04-09	**(Humanetics) Results of the latest test serieson the effect of lateral tilton the headrest test results**
GTR7-04-10	**(Humanetics) A Summary of Current Known Sources of Dummy to Dummy Variation**
GTR7-04-11	**(Humanteics) Review and Approval of Recommended Certification Tests for Bio RIDII**
GTR7-04-12	**(Humanetics) BIO RID II design evaluation checklist - Draft 9/21//2010**
GTR7-04-13	**(Humanetics) BIO RID II design evaluation checklist - Draft 9/21/2010**
GTR7-04-14	**(USA) Bio RID II Preliminary Repeatability Assessment & Biofidelity Assessment**
GTR7-04-15	**(USA) Compatibility Between Two Rear Impact Dummies and Two Rear Impact Pulses**
GTR7-04-16/Rev.1	**(Japan) Japan Research Activities in the GTR-7 Phase 2 amendment Bio RID II seating proposal #4**

GTR7-04-17	**(OICA) GTR head restraints Torso angle ranges Distribution in vehicle categories**
GTR7-04-18	**(SAE) SAE HADD J826 3D CAD H-Point Manikin GTR GTR-7 Update**
GTR7-04-19	**(Japan) gtr No.7 Regulatiion Flow Chart Proposal**
TEGID-01	(First Technology) Seat/Head Restraint Test Sled Pulse Summary
TEGID-02	(Denton) Global Bio RID-II User's Meeting
TEGID-03	**(Denton) Welcome to TEG Bio RID Meeting (March 15, 2010)**
TEGID-04	**(First Technology) FTSS Harmonized Bio RID Sled**
TEGID-05	**(PDB) Bio RID Comparison upright vs. normal spine adjustment**
TEGID-06	**2nd WebEX Meeting of the Bio RID TEG Draft AGENDA**
TEGID-07	**(Ford) Bio RIDII New Sled Evaluation**
TEGID-08	**(Denton) Denton ATD Update to Bio RID II TEG**
TEGID-09	**3rd Meeting of the IWG GTR No. 7 - Draft Status Report of the Bio RID TEG**
TEGID-10	**(GM) GM Bio RID Fx Data Issue Final Results - Report to GTR/TEG**
TEGID-11	**4th WebEX Meeting of the Bio RID TEG**
TEGID-12	**GTR 7 (Phase II) Informal Group Meeting 21/22 September 2010**
TEGID-13	**Draft Minutes of 3rd WebEX Meeting of the Bio RID TEG on 13th of July 2010**
TEGID-14	**(Katri) Bio RID-II Neck Bumper**
TEGID-15	**(PDB) Possible causes for the poor reproducibility of neck forces and moments of the Bio RID-II First findings**

Bio RID II Drawing package 7/23/10 version

GRSP-47-17/Rev1	(Japan) Head restraint gtr Phase2 Status and Open issues